HDSL4

QUICK INSTALLATION

H4TU-R-402 LIST 1
REMOTE UNIT

ADC

H4TU-R-402 List 1

The H4TU-R-402 List 1 remote unit (H4TU-R) functions as the remote end of a T1 transmission system. The H4TU-R, when used in conjunction with an HDSL4 line unit (H4TU-C), transmits a 1.544 Mbps T1 payload a maximum distance of 12 kft over two unconditioned copper pairs (26 AWG). Using two HD4-409 List 1 doublers (H4Ds), the Carrier Service Area (CSA) reach can be extended to 34 kft. (see "Specifications").

Features

- 1.568 Mbps full-duplex transmission over two unconditioned copper pairs
- Status Light Emitting Diodes (LEDs) for Digital Signal Level 1 (DS1) and HDSL4
- Craft port access for maintenance terminal connection
- Bit Error Rate Tester (BERT)
- Ultra-low wander
- Supports both local and line powering
- Generic and addressable repeater loopback activation codes
- Lightning and power cross-protection on HDSL4 and DS1 interfaces
- DS1 transmit and receive bridging jacks for testing
- Remote provisioning
- Narrow 200 mechanics

Specifications

Operating Temperature	-40°F to +149°F (-40° C to + 65° C)
Operating Humidity	5% to 95% non-condensing
Maximum CSA Reach	34 kft. using 26 AWG: 12 kft. (span 1), 11 kft. (span 2), 11 kft. (span 3)
HDSL4 Span Voltage	0, -185 Vdc, ±123 Vdc (voltage is applied across loop 1 and loop 2.)
Power Consumption	5.2W
CO Supply	-48 Vdc nominal (-42.5 Vdc to -56.5 Vdc)
Mounting	Narrow 200 mechanics shelf (half-width 400 mechanics)
HDSL4 Line Rate	784 kbps Overlapped Pulse Amplitude Modulation (OPAM) transmission per pair
HDSL4 Output	+14 dBm ±0.5 dBm, 135Ω
Maximum Insertion Loss	Span 1 = 47 dB at 196 kHz Span 2 and Span 3 = 43 dB 196 kHz
Electrical Protection	Secondary surge and power cross-protection on all DS1 and HDSL4 ports
Line Impedance	135Ω
DS1 Pulse Output	0 dB, -7.5 dB, -15 dB
DS1 Line Rate	1.544 Mbps ±200 bps
DS1 Line Format	Alternate Mark Inversion (AMI), Bipolar with 8-zero Substitution (B8ZS), or Zero Byte Time Slot Interchange (ZBTSI)
DS1 Frame Format	Extended SuperFrame (ESF), SuperFrame (SF), or THRU (unframed)

COMPATIBILITY

The H4TU-R-402 List 1 remote unit is compatible with ADC H4TU-C List 1 and H4LXC Version A line units, and H4D-409 doublers. For information on HDSL4 line units and the HD4 doubler unit, refer to the applicable document.

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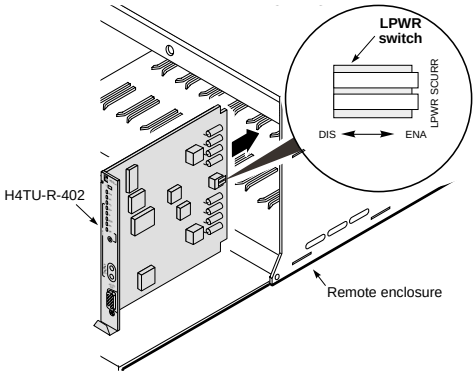
1 INSTALLATION



1 Set the S1 switches (SCURR and LPWR), located adjacent to the card-edge connector, as follows:

SCURR and LPWR Switch Settings

SCURR	Disable (default)	Disables the flow of simplex sealing current from the upstream unit.
	Enable	Enables the flow of simplex sealing current from the upstream unit.
LPWR	Line power (default)	Configures the H4TU-R-402 to receive power from the upstream line unit over the HDSL pairs.
	Local power	Configures the H4TU-R-402 to receive power from a local -48 Vdc supply. If local power is not present, the HRU reverts to line power mode.

2 Align the HRU with the enclosure slot guides, then push the unit in until it is properly seated in the backplane.

To comply with the intrabuilding wiring requirements of GR-1089 CORE, Section 4.5.9., the shield of the ABAM-type cables that connect the H4TU-R-402 List 1 DS1 output ports to the cross-connect panel must be grounded at both ends.

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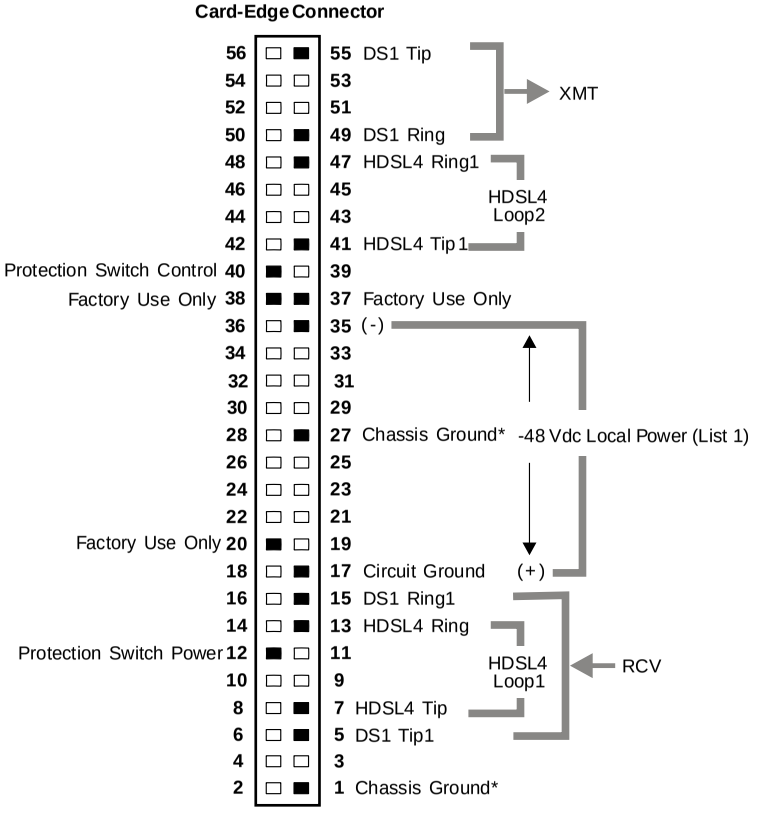
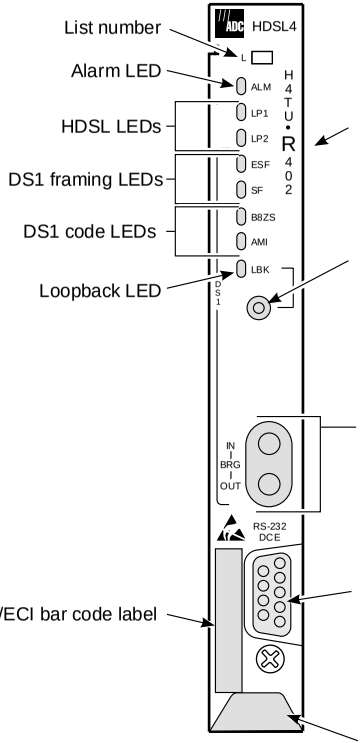


*Chassis Ground may be tied to earth ground per local practice.
Note: Active pins are highlighted in black.



LPWR switch

Located on circuit board next to card-edge connector. See "1 Installation," step 2, for more information.

Loopback control button

Pressing the button for 5 seconds activates a remote loopback towards the network, called a Network Remote Loopback (NREM). Any existing loopback is terminated before NREM is activated. The unit can be looped down by either pressing the LPBK control button again for 5 seconds or by the standard loopdown inband messages.

DS1 transmit (IN) and receive (OUT) bridging jacks

For non-intrusive test access to the DS1 signal received by (IN) and transmitted from (OUT) the Customer Premises Equipment (CPE). Allows testing of signals to and from the CPE.

Craft port provisioning

To access all system maintenance, provisioning and performance screens, connect a standard 9-pin terminal cable between the serial port on a PC and the H4TU-R craft port.

Modem settings:
1200-9600 baud
8 data bits
No parity
1 stop bit
Hardware flow control: OFF
Terminal emulation: VT100

2 VERIFICATION

After the H4TU-R is installed, verify that it is operating properly by monitoring the status LEDs on the front panel.

Status LED Descriptions

LED Status		Description
ALM LED (red)		Indicates alarm state for remote and local Loss of Signal (LOS).
	Solid	Loss of Signal (LOS) condition at the T1 input of the HRU.
	Blinking	LOS condition at the T1 input of the line unit.
LP1 and LP2 LEDs (green)		Indicates HDSL4 Loop 1 (LP1) and Loop 2 (LP2) condition.
	Solid	Solid green = HDSL4 loop is in sync.
	Blinking	Once per second = HDSL4 loop is trying to acquire sync.
		4 times per second = Margin alarm condition on HDSL4 loop.
		10 times per second = Cyclical Redundancy Check (CRC) error on HDSL4 loop.
	OFF	No activity on HDSL4 loop.
ESF and SF LEDs [a] (green)		Indicates framing patterns.
ESF	Solid	Extended Super Frame (ESF) framing pattern.
SF	Solid	Super Frame (SF) framing pattern.
ESF and SF	Blinking	Once per second = Frame error detected.
ESF and SF	OFF	Unframed or no signal.
B8ZS and AMI LEDs [a] [b] (green)		Indicates DS1 code options.
B8ZS LED	Solid	DS1 line code option is set to Bipolar with 8-Zero Substitution (B8ZS).
	Blinking	Once per second = String of excessive zeros detected.
AMI LED	Solid	User DS1 line code option is set to Alternate Mark Inversion (AMI).
	Blinking	Once per second = Bipolar Violation (BPV) detected.
LBK LED (yellow)		Shows loopback states to and from the network and to and from the Customer Interface (CI).
	Solid	Network Remote (NREM), SmartJack (SMJK), or Transmit Loss of Signal (TLOS) loopback.
	Blinking	Once per second = Customer Local (CLOC) loopback state.
		4 times per second = HRU in Armed state.

(a) If DS1 signals are not detected, the ESF, SF, B8ZS, and AMI LEDs do not illuminate.
(b) When optioned for AUTO LINE CODE, these LEDs indicate when an AMI or B8ZS DS1 code is detected.

REACH

The maximum reach of the H4TU-R-402 is based on a maximum signal loss over span 1 of 47 dB@196 kHz and a a maximum signal loss over spans 2 and 3 of 43 dB@196 kHz. The following table lists the reach as a function of cable gauge.

HDSL4 Maximum Reach Chart

Cable Gauge	Reach (kft.)		Loop Attenuation (dB per kft.)	Insertion Loss [a] @196 kHz (dB per kft.)	Ω/ kft.
	Span 1	Spans 2 and 3			
26 (0.4 mm)	12	11.0	2.8	3.88	83
24 (0.51 mm)	16	15.0	2.0	2.84	52
22 (0.61 mm)	21	20.6	1.6	2.18	32
19 (0.91 mm)	29	27.8	1.1	1.54	16

(a) Insertion Loss = 1.38 times loop attenuation

3 LOGGING ON TO THE MAIN MENU

The H4TU-R-402 supports local and remote logon through a maintenance terminal (VT100 or a PC running VT100 terminal-emulation software). In HDSL4 systems equipped with the H4TU-C, the maintenance terminal connects to the H4TU-C front panel craft port. In HDSL4 systems equipped with the H4LXC, the maintenance terminal connects to the front panel craft port of the Shelf Control Unit (SCU) controlling the H4LXC.

Remote login creates menus and screens for the H4TU-R that are identical to those viewed at the H4TU-C or H4LXC. Once logged on, you can view system settings and inventory, initiate loopbacks, monitor performance, and provision the circuit.

To log on and access the H4TU-C Remote Terminal Main Menu screens:

1. Press the **SPACEBAR** several times to display the Remote Login screen.
2. Press the **ENTER** key to view the Maintenance Terminal Screen. The Remote Terminal Main Menu items are replications of the line unit screens. Depending on the line unit attached to the H4TU-R-402, remote provisioning may be available.

To log on and access the H4LXC Main Menu screens:

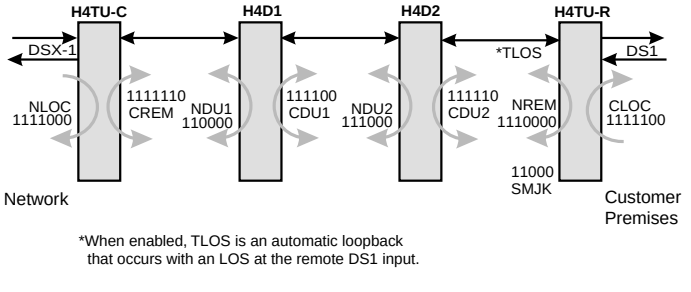
1. Press the **ENTER** key twice to display the Logon screen.
2. Type the assigned logon ID in the **Enter Username** field. If a logon ID is not assigned, type SONEPLEX (default), then press **ENTER**.
3. Type the assigned password at the **Enter Password** field. If a password is not assigned, type SONEPLEX1.
4. Press the **ENTER** key to view the Main Menu screen.

The H4TU-C can be provisioned at the H4TU-C front panel or through the maintenance terminal screens at the HMU managing the H4TU-C. The H4LXC is provisioned through the maintenance terminal screens at the SCU managing the H4LXC. For more information on the maintenance terminal screens, refer to the applicable H4TU-C or H4LXC line unit user manual.

4 LOOPBACK TESTING

Initiate loopback testing from the maintenance terminal menus or by using in-band codes. The inband codes shown below can be sent by a test set. For more information, refer to the applicable H4TU-C or H4LXC line unit user manual.

H4TU-C Configured Systems

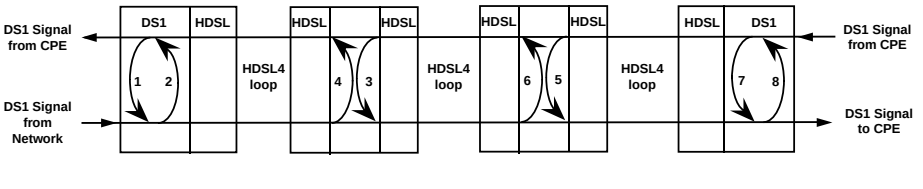


*When enabled, TLOS is an automatic loopback that occurs with an LOS at the remote DS1 input.

H4TU-C GNLB Loopback Commands

Loopback	In-Band Code	Description
NLOC	1111000	DSX-1 signal is looped back to the network at the H4TU-C.
NREM	1110000	DSX-1 signal is looped back to the network at the H4TU-R.
SMJK	11000	DSX-1 signal is looped back to the network at the H4TU-R SmartJack module.
CREM	1111110	DS1 signal from customer is looped back to the customer at the H4TU-C.
CLOC	1111100	DS1 signal from customer is looped back to the customer at the H4TU-R.
Loopdown	11100	Deactivates any of the above loopbacks.

H4LXC Configured Systems



H4LXC Default Codes for Programmable Loopback Operations

Operation	Default Binary Code	Description
Loopup H4LXC	1101 0011 1101 0011	Activates a loopback at the specified unit. Unit goes from Armed to loopup state.
Loopup H4D1	1100 0111 0100 0001	
Loopup H4D2	1100 0111 0101 0100	
Loopup H4TU-R	1100 0111 0100 0010	
Loopdown (all units)	1001 0011 0110 0011	Deactivates the loopback. Unit goes from loopup state to Armed state.
Loopup time-out disable	1101 0101 1101 0110	Disables loopup time-out. Loopback stays active until deactivation or disarm code is received.

FCC Class A Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Limited Warranty

Product warranty is determined by your service agreement. Contact your sales representative or Customer Service for details.

Modifications

Any changes or modifications made to this device that are not expressly approved by ADC DSL Systems, Inc. voids the user's warranty.

All wiring external to the products should follow the provisions of the current edition of the National Electrical Code.

Standards Compliance

This equipment has been tested and verified to comply with the applicable sections of the following safety standards:

- GR 63-CORE - Network Equipment-Building System (NEBS) Requirements
- GR 1089-CORE - Electromagnetic Compatibility and Electrical Safety
- Binational standard, UL-60950, 3rd Edition/CAN/CSA C22.2 No. 60950-00: Safety of Information Technology Equipment

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